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Mackenzie Timber Supply Area

Rationale for Allowable Annual Cut (AAC) Determination

Effective December 1, 2001

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Chief Forester

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Objective of this document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed as chief forester of British Columbia in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for the Mackenzie Timber Supply Area (TSA). This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TSA

The Mackenzie Timber Supply Area (TSA) is situated in the northeast interior of British Columbia and is the fourth largest TSA in the province, covering approximately 6.41 million hectares. The TSA is one of six in the Prince George Forest Region and is administered by the British Columbia Forest Service (BCFS) Mackenzie Forest District office located in Mackenzie.

The topography of the Mackenzie TSA is variable. The Rocky Mountain Trench, with its flat to gentle terrain, runs from north to south through the centre of the TSA. To the east are the rugged Rocky Mountains and to the west are the more rounded Omineca Mountains. Williston Lake — a narrow 360-kilometre long lake created by the WAC Bennett Dam on the Peace River — is one of the most prominent geographical features in the area.

Despite the diverse terrain of mountains and river valleys, the forests of the Mackenzie TSA are fairly homogeneous. The primary tree species are lodgepole pine and spruce, but forests are also comprised of subalpine fir (balsam), and several deciduous species. Cold temperatures dominate the climate in the TSA, with average daily temperatures below freezing for half of the year. Three-quarters of the annual precipitation falls as snow.

About 71 percent of the Mackenzie TSA land base is considered Crown productive forest land (approximately 4.5 million hectares). This includes 1.78 million hectares of protected areas and special resource management wildland zones, where timber harvesting is not permitted. Currently about 32 percent of the Crown productive forest land or 23 percent of the total TSA land base is considered available for harvesting.

The Mackenzie TSA is sparsely populated. About 95 percent of the estimated population of 6,360 (1996 census) live in the community of Mackenzie. Other small settlements include Germansen Landing and Manson Creek, and the First Nations communities of Fort Ware and Tsay Keh. There is very little dispersed rural settlement within the TSA.

History of the AAC

The Mackenzie TSA was established in 1981 with an AAC of 2 900 000 cubic metres. In 1989, the AAC was increased by 51 121 cubic metres to 2 951 121 cubic metres. In 1996, the chief forester increased the AAC to 2 997 363 cubic metres to include a 50 000 cubic metre partition for deciduous-leading stands as well as a small adjustment for volume issued to woodlots. That level remains in effect today and is currently apportioned by the Minister of Forests as follows:

Apportionment	cubic metres/year	Percentage
Forest Licences – replaceable (2)	2 594 383	86
SBFEP	147 040	5
Temporary permits	205 940	7
Deciduous-leading stands	50 000	2
Total	**2 997 363**	**100.0**

New AAC determination

Effective December 1, 2001 the new AAC for the Mackenzie TSA will be 3 050 000 cubic metres. This AAC includes a partition of 100 000 cubic metres for deciduous-leading stands and excludes all volume allocated to woodlot licences since the 1996 determination.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information sources used in the AAC determination

Information considered in determining the AAC for the Mackenzie TSA include the following:

- *Mackenzie TSA Data Package and Information Report*, BCFS, April 2000;
- *Mackenzie TSA Analysis Report and Public Discussion Paper*, BCFS, April 2001;
- Mackenzie TSA draft Summary of Public Input on Data Package and TSA Analysis Report, BCFS, June 2001;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives for the province;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives for the province regarding visual resources;
- Technical review and evaluation of current operating conditions through comprehensive discussions with staff of the BCFS, including the AAC determination meeting held in Mackenzie, June 13 and 14, 2001;
- *Mackenzie TSA Rationale for AAC determination*, BCFS, September, 1996;
- *Mackenzie TSA Timber Supply Analysis*, BCFS, September 1995;
- *Mackenzie TSA Socio-Economic Analysis*, September 1995;
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act* Regulations and Amendments, current as of March 2001;
- Forest Practices Code of British Columbia Guidebooks, BCFS and MELP;

- *Mackenzie Land and Resource Management Plan (LRMP)*, 2000;
- *Mackenzie TSA Inventory Audit*, BCFS Inventory Branch, recompiled November 2000;
- *Forest Practices Code Timber Supply Analysis*, 1996;
- *Identified Wildlife Management Strategy*, February 1999;
- *Landscape Unit Planning Guide*, BCFS and MELP, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and MELP, November 1996.

Role and limitations of the technical information used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for the Mackenzie TSA, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and Tree Farm Licences (TFLs). Section 8 is reproduced in full as Appendix 1.

Guiding principles for AAC determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. In making a large number of determinations for many forest management units over extended periods of time, administrative fairness requires

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consistency when addressing these changes and associated uncertainties. To make my approach in these matters explicit, I have set out the following body of guiding principles. If in some specific circumstance it is necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge—a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires me to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were originally approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although the Forest Practices Code has been fully implemented since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination I take this uncertainty into account to the extent possible in context of the best available information.

The eventual timber supply impacts associated with strategic land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy, and Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be my position that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions not yet taken by government. Thus I do not account for possible impacts of existing or anticipated

recommendations made by such planning processes, nor do I attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impacts in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are deducted from the timber harvesting land base and are no longer considered to contribute to the timber supply in AAC determinations.

In the Mackenzie TSA, government's approval of the Mackenzie LRMP in November, 2000, and decisions on protected areas have clarified many aspects of land and resource use and management. The implementation of the LRMP will provide further certainty regarding resource management in the area.

Forest Renewal British Columbia (FRBC) funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long-term. As with all components of my determinations, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete, but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to re-determine many outdated AACs between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, I should immediately reduce some AACs in the interest of caution. However, any AAC determination I make must be the result of applying my judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within the Mackenzie TSA. It is also independent of any decision by the Minister of Forests with respect to subsequent allocation of the wood supply.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government. I am aware that the Kwadacha and the Tsay Keh Dene First Nations are almost entirely located within the TSA, including their main communities of Fort Ware and Tsay Keh, respectively. An area was excluded from Mackenzie TSA as provided by the treaty signed with the McLeod Lake First Nation. The traditional territories of the Takla Lake, Nak'azdli, West Moberly and Halfway River First Nations are primarily located outside the TSA but portions of their traditional territories overlap with the Mackenzie TSA. As any decisions on treaty negotiations with any of those First Nations are undertaken by government, they will be reflected in future AAC determinations for the TSA.

Overall, in making AAC determinations, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act* and of my responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

The role of the base case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TSA, a timber supply analysis is carried out using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model (Forest Service Simulator, or FSSIM), a series of timber supply forecasts are produced, reflecting different decline rates, starting harvest levels, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TSA is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may well have changed since the original information package was assembled. Forest management data is particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber supply analysis for the Mackenzie TSA

The base case harvest forecast presented in the *April 2001 Mackenzie Timber Supply Area Analysis Report* incorporated the best available information on current forest management, land base and timber yields for the TSA. It included specific assumptions related to the following: implementation of the Forest Practices Code, delineation of interim landscape units and draft biodiversity emphasis options, designation of scenic corridors, and other specific management direction arising from the LRMP. These assumptions are discussed in the aforementioned timber supply analysis report. In this rationale, I will discuss many of those assumptions in the context of my considerations for this AAC determination. However, where my review of an assumption has concluded that I am satisfied it was appropriately modelled in the base case of the timber supply analysis, I will not discuss my considerations in detail in this document.

In the timber supply analysis, the initial harvest level assumed in the base case harvest projection was 2 997 363 cubic metres per year. This harvest level represents the level of the current AAC.

The base case initial harvest level was not reduced to account for the volume issued to woodlot licences since the 1996 determination.

With the factors described above and others appropriate to the TSA incorporated, a 'base case' was generated and submitted for public review. In this base case harvest forecast, the initial harvest level of 2 997 363 cubic metres per year could be maintained for

two decades, followed by an approximately 10 percent increase to the long-term harvest level of 3 305 000 cubic metres per year.

Specific considerations which led to the choice of the base case harvest forecast included establishing an initial harvest level at the current AAC, and providing for an orderly transition from harvesting existing natural stands to future managed stands. In addition, a slightly greater volume of wood is available over the analysis horizon in the chosen base case harvest forecast than in the other alternatives. I have considered the reasoning used to select the base case and I am satisfied that it provides a suitable basis from which to evaluate the assumptions regarding land base, management practices and timber yields.

I have also considered all public input received on the data package and analysis report, and where appropriate I have discussed my considerations under the various factors presented in this rationale.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social reasons. In the Mackenzie TSA, the deductions (summarized in the *April 2001 Mackenzie Timber Supply Area Analysis Report*) result in a timber harvesting land base of 1 446 398 hectares, or approximately 32 percent of the Crown productive forest land.

I have considered all of the deductions applied in the derivation of the timber harvesting land base for the Mackenzie TSA.

Those factors associated with the derivation of the timber harvesting land base for which, based on my thorough review, I accept the assumptions applied in the analysis are not discussed below. These factors include physically inoperable areas, environmentally sensitive areas and specific geographically defined areas.

Where my consideration of the information has identified a factor which in my estimation requires discussion in this document, it is described below.

- economic operability

The Mackenzie TSA includes 598 000 hectares of mature coniferous-leading (balsam, pine and spruce) stands with relatively lower volume and poorer quality timber.

BCFS regional and district staff completed a study of harvesting history to determine criteria for the assessment of economic operability of stands in the Mackenzie TSA. Criteria developed by staff based on data from the study include access, stand volume, species and harvesting system.

To determine access, district staff classified stands across the TSA into one of the three haul zones (near, medium and far) according to the distance from the local wood-processing facilities or from suitable log dumping sites in the Williston Reservoir. Stands were classified in the near zone if they were located within 59 kilometres of either of these two sites, and in the medium zone if they were located between 60 and 150 kilometres. The remainder of stands in the TSA were classified as within the far zone. Following the various exclusions applied to account for economic operability, as discussed below, approximately 56 000 hectares of stands in the far zone were retained in the timber harvesting land base. These stands comprise 4 percent of the timber harvesting land base.

A number of different exclusions were applied in the timber supply analysis to account for economically inoperable stands, including exclusions for marginal stands, problem forest types, deciduous stands, low volume stands, lower productivity stands and special planning cells. In total, approximately 631 000 hectares of stands were excluded as a result of being economically inoperable. The exclusions are discussed below, with the exception of those applied to deciduous-leading stands, which are discussed under *deciduous stands* later in this rationale.

Having reviewed the classification of the land base into access zones, I am uncertain about the viability of the stands located in the far zone. The timber supply contribution from the stands located in the far zone is subject to fair uncertainty because of the higher cost of access. Sensitivity analysis was conducted to assess the implications to timber supply if these stands prove to not be economical to harvest. The results indicate that short-term timber supply was unaffected. The initial harvest level was maintained for two decades before increasing to mid- and long-term levels approximately 4 percent lower than those in the base case projection.

I am aware that several comments were received from the public and licensees in the TSA regarding operability. I have reviewed these comments and conclude that operability represents a significant source of uncertainty in timber supply for this TSA. In particular, I am concerned about the long term contribution of stands located in the far access zone. I will weigh this uncertainty into my decision and will discuss this further under 'Reasons for decision'.

I request that district and regional staff reassess the economic operability prior to the next determination for the Mackenzie TSA, so that evolving management practices and additional new information can be incorporated.

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Following is a discussion of the various exclusions applied in the analysis to account for stands not considered to be economically operable.

1) marginal coniferous stands

In a further assessment of the economic operability of stands, district staff used criteria of leading species, age, height and stocking to delineate and exclude marginal coniferous-leading stands. Approximately 227 000 hectares of balsam-leading stands, 35 000 hectares of spruce-leading stands and 87 000 hectares of pine-leading stands were excluded. Only those marginal stands in the near harvesting zone were considered to contribute to timber supply.

Licensees in the TSA contend that some of the marginal coniferous stands excluded in the analysis are harvestable and should contribute to timber supply. In their input, licensee staff cited examples of past harvesting in the excluded stands, indicating that up to 10 percent of recent harvesting has occurred in these types of stands.

However, district staff indicate that the exclusions applied in the analysis for marginal coniferous-leading stands reflect the limits of current operational harvesting performance in the TSA. Staff note that, in conjunction with licensee staff, they recently studied the options for new and innovative opportunities to utilize marginal coniferous-leading stands through the Mackenzie TSA. The study results indicated that few marginal stands have been logged in the past, and few have been included in recent forest development plans.

In fact, staff indicate that the suitability for harvest of the balsam-leading stands retained in the timber harvesting land base is very dependent on market conditions, and these stands are currently of questionable merchantability. Approximately 121 000 hectares of the most productive balsam-leading stands located in the near and medium zones were retained in the timber harvesting land base following the various exclusions applied to account for economic inoperability.

Sensitivity analysis was conducted to assess the implications to timber supply if these stands prove to not be harvestable. Exclusion of all balsam-leading stands reduces the timber harvesting land base by a further 8.4 percent. The sensitivity analysis results indicate that the base case initial harvest level could be maintained for 2 decades before dropping by 4.9 percent to a mid-term level of 2 851 000 cubic metres per year. The mid-term level is 13.7 percent below that projected in the base case harvest forecast.

Having reviewed the information, I believe it is possible that many of the balsam-leading stands may indeed be shown to be unmerchantable in the Mackenzie TSA. I therefore accept that there is a risk to mid and long-term timber supply as a result of assuming contribution from these stands in the analysis, and I will discuss my considerations of this further under 'Reasons for decision'.

With respect to the remainder of the marginal coniferous-leading stands, I encourage licensees to collect the necessary data if they believe a proportion of harvesting operations is occurring in such stands. Should information become available over the term of this determination which would indicate that harvesting is consistently occurring these stands

outside the operable land base, then I recommend that operability be reviewed and adjusted to reflect this performance for the next AAC determination.

2) problem forest types

Stands that are physically operable and exceed low site criteria yet are not currently utilized because of low timber quality or volume are referred to as problem forest types. Obviously, this definition is based on economic criteria, for the purpose of defining the net operable land base. It does not imply that these types of forests are not important in terms of their role and function in the ecosystem.

District staff reviewed current harvesting and Forest Development Plan (FDP) data to determine descriptive criteria for problem forest types. Problem forest types in the Mackenzie TSA were defined as follows: coniferous stands greater than 140 years old and less than 11 metres in height; and deciduous stands greater than 80 years old with less than 17 metres in height. These stands were entirely excluded in the derivation of the timber harvesting land base, for a total of 20 270 hectares.

Having reviewed the information about problem forest types and discussed the exclusions with district staff, I am satisfied that that analysis assumptions appropriately reflect current harvest limitations in the Mackenzie TSA. As a result, I accept that the best available information was used in the timber supply analysis, and make no adjustments on account of this factor.

3) low volume stands

Using data from the FDP review, staff determined minimum volume thresholds for stands. Mature coniferous-leading stands were categorized by species, logging system, and haul zone, and a specific minimum volume (between 170 and 210 cubic metres per hectare). Stands that did not meet the minimum criteria were assumed to be economically inoperable and were excluded from the timber harvesting land base. In total, 180 516 hectares of mature, low volume stands were excluded using these criteria.

I have reviewed the assumptions about low volume mature stands in the Mackenzie TSA and I am satisfied that the exclusions applied in the analysis to account for these stands were appropriate and reflective of current operational constraints.

4) lower productivity stands

Immature stands growing on low productivity sites were also excluded. Coniferous-leading stands less than 141 years old were categorized by species, logging system and haul zone and a specified minimum site index (between 8.9 and 12.3 metres). Stands that did not meet the minimum criteria were assumed to be inoperable and were excluded from the timber harvesting land base, for a total of 62 342 hectares.

I have reviewed the assumptions used to exclude immature stands on low productivity sites, and accept that the exclusions were reasonable and based on the best available information.

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5) special planning cells

District staff also identified some small, isolated areas in the TSA where the cost of accessing the timber would exceed the value derived from harvest. These areas were excluded in the derivation of the timber harvesting land base, for a total of 19 515 hectares.

District staff indicate that some additional areas remaining in the timber harvesting land base may also meet the same criteria as those used to exclude the small, isolated areas. However, staff are uncertain as to the extent of these areas.

Having reviewed the information about these isolated areas, I commend staff for attempting to refine the accessible land base to account for small isolated areas unlikely to be economical to harvest. I accept that the best available information was used in the analysis, and I will make no further adjustments on account of this factor. I encourage district staff to continue to review the land base in order to facilitate identification of these areas and ongoing refinement of the exclusions.

- deciduous stands

There are approximately 182 000 hectares of deciduous-leading stands in the Mackenzie TSA. Deciduous-leading stands located north of the Peace Arm, and those in the far zone, were entirely excluded from the timber harvesting land base, for a total of 94 987 hectares. Some of deciduous-leading stands located south of the Peace Arm were also excluded from the timber harvesting land base through the exclusions applied for economic operability, such as those for problem forest types, low productivity stands, and low volume forest types.

Approximately 53 000 hectares of deciduous-leading stands remain in the timber harvesting land base following the exclusions applied in the analysis. About 70 percent of these stands are currently older than the minimum harvestable age of 60 years.

All volume from deciduous species occurring in coniferous-leading stands—totalling approximately 100 000 cubic metres annually—was excluded from the volume estimates in the analysis.

In the base case, a volume contribution from deciduous-leading stands was set at 50 000 cubic metres per year. Operationally, district staff indicate that very little harvesting has occurred to date in deciduous-leading stands. However, several licensees in the TSA have expressed increased interest in utilizing deciduous timber. Several timber processing facilities for deciduous volume have been proposed in the surrounding area. Licensee input included a request to increase the amount of volume partitioned to deciduous stands to 150 000 cubic metres per year, citing data from a low intensity ground sampling project.

Several sensitivity analyses were conducted to assess the timber supply implications of assuming different volume contributions from deciduous-leading stands than in the base case. In the first sensitivity analysis, the maximum annual volume contribution possible from those deciduous-leading stands in the timber harvesting land base was assessed. The

results indicate that deciduous stands in the timber harvesting land base could support an annual harvest of 90 000 cubic metres per year.

A second sensitivity analysis tested the volume contribution possible from *all* deciduous-leading stands in the TSA meeting the minimum low site and low volume criteria applied in the analysis. These results indicate that if these stands were assumed to be harvestable, the total deciduous volume contribution could be as high as 145 000 cubic metres per year. A third sensitivity analysis indicates that the medium-term harvest level could be 3 percent greater than the level projected in the base case, if the deciduous volume in the coniferous-leading stands was assumed to contribute to timber supply.

Licensees contend that the volume contribution from deciduous-leading stands in the base case was underestimated. They also emphasized that the criterion used to exclude low sites (site index less than 18 metres) for deciduous-leading stands is too high. District staff agree that the site index used may be too high, but do not currently have data to define a more appropriate level.

MELP staff expressed concern about the implications to biological diversity that may result from increased harvest in deciduous-leading stands.

I have reviewed the information about deciduous-leading stands in the Mackenzie TSA. Although there has been a limited amount of demonstrated performance in deciduous-leading stands to date, I am aware of the intense interest expressed by licensees locally. Provincially, harvesting performance in deciduous-leading stands has increased in recent years. I also note that while I am not sufficiently confident in the data from the study cited by licensees to increase the existing deciduous partition to 150 000 cubic metres per year, I do believe that a higher contribution can be achieved than represented in the current partition.

I note that the sensitivity analysis results indicate that deciduous-leading stands meeting the low site and other economic operability criteria could contribute as much as 90 000 cubic metres annually to the harvest forecast. In addition to this contribution, I am aware of the uncertainty around the low site criteria which could further increase the number of stands economical and available to harvest.

I am also aware that the majority of deciduous-leading stands in the TSA are currently older than the minimum harvestable age. Given the higher incidence of decay in older, deciduous-leading stands, an increased level of harvest in these stands would be advisable to minimize losses of merchantable volume.

Given all of the information above, I am satisfied that it is appropriate to assume a higher contribution from deciduous leading stands to timber supply in the Mackenzie TSA. I assess that 100 000 cubic metres per year would be appropriate. Given the limited harvesting performance, and the uncertainty around economic operability associated with varied market conditions, I am further satisfied that it is appropriate to partition this volume in my determination. I will discuss my considerations of this further under 'Reasons for decision'. I note that the deciduous volume contribution could be higher if the deciduous species occurring in coniferous stands were utilized, and if merchantability limits are

decreased. However, given the uncertainty overall, and the concern expressed by MELP staff, I am applying some caution at this time and ensuring that there is the flexibility to satisfy biological considerations.

I request that BCFS and Ministry of Water Land and Air Protection (formerly MELP) staff work to refine and clarify objectives for biodiversity with respect to deciduous-leading stands in the TSA. In particular, data on the successional pattern of deciduous stands and the level of deciduous harvest likely to best meet management objectives would be useful for future analyses for the Mackenzie TSA.

- woodlots

The Forest Act requires that AACs determined for TSAs and TFLs not include the areas issued to woodlot licences.

Since the previous determination, approximately 4620 hectares has been issued in woodlot licences, with an accompanying issued volume of 11 000 cubic metres. In the timber supply analysis, 851 hectares were excluded from the timber harvesting land base. None of the volume issued to woodlot licences was excluded from the base case initial harvest level.

I have reviewed the information presented about woodlot licences in the Mackenzie TSA. I am satisfied that the timber harvesting land base has been overestimated by approximately 3770 hectares. I will take into account in this AAC determination the implication to timber supply of excluding the area and volume attributable to woodlot licences, and I will discuss my considerations of this further under 'Reasons for decision'.

- roads, trails and landings

In the analysis, a percentage of the productive forested area was excluded to account for the permanent loss of productive land to roads, trails and landings. Separate estimates are made for existing and future structures, to reflect both potential changes in road building practices and road network requirements over time. Estimates account for the area that is permanently removed from the timber harvesting land base.

In the analysis, width and length measurements from current existing roads were used to calculate a suitable land base reduction for access structures. The resulting value was also assumed to be representative of future site productivity loss as a result of future construction. The value of 4.5 percent resulted in approximately 9500 hectares being excluded to account for current roads, and approximately 70 000 hectares excluded to account for future roads.

Licensee staff questioned the average right-of-way width assumptions in the analysis. In their opinion, road widths were overestimated in the timber supply analysis, and the corresponding land base reduction to account for roads should have been less than 4 percent. However district staff indicate that the assumed right-of-way widths were developed based on the professional judgement of district engineering staff, and are an appropriate reflection of current operational practices in the TSA.

I have considered the information about the accounting in the analysis for both existing and future roads, trails and landings and discussed this information with district staff. I am satisfied that the methodology used to derive estimates for roads, trails and landings was the best information available and has resulted in exclusions which provide a reasonable reflection of productivity losses resulting from both current and anticipated operational practices.

I encourage district and licensee staff to work together to ensure that reductions continue to reflect operational practices. If licensee staff are still concerned that assumptions in the analysis overestimate the loss of productivity as a result of access structures, I encourage them to work with district staff over the term of this determination to refine estimates. Any additional data can be incorporated into the next determination.

Existing forest inventory

The inventory data used for the timber supply analysis is based on a recent forest inventory completed between 1990 and 1997. For the analysis, the inventory file was updated to January 1, 1999 to account for changes in ownership, growth, and denudation through harvesting or fire.

I have considered the information about the forest inventory. Subject to my considerations under *existing stand volumes*, I am satisfied that the best available information was used in the analysis.

- existing stand volumes

Volumes for existing natural stands were estimated and projected using forest inventory attributes and the Variable Density Yield Prediction (VDYP) model which was developed by the BCFS Resources Inventory Branch.

An inventory audit on the previous inventory data for the Mackenzie TSA was completed in 1994. The results indicated that existing stand volumes in the previous inventory data were overestimated by 10 percent.

BCFS Resources Inventory Branch staff attempted to recompile the results of the audit against data from the new inventory in 2000. The recompiled audit data indicated that the existing stand volumes of the new inventory may still be overestimated by up to 10 percent. However, these results were assessed to be uncertain due to the difficulties associated with applying the old audit information to the new inventory.

I have considered the information about the volume estimates for existing stands in the Mackenzie TSA, including the implications of the recompiled audit findings. I agree that it is difficult to assess the application of the audit to the existing stand volumes estimated from the current inventory data. However, I am mindful of the potential risk posed to timber supply if indeed existing stand volumes are overestimated by the inventory file attributes.

A sensitivity analysis was conducted to examine the effect of decreasing existing stand volumes by 10 percent. Results indicate a decrease in mid-term timber supply. However, the initial harvest level projected in the base case could still be maintained for 9 decades before increasing to a higher long-term harvest level.

The results of the sensitivity analysis indicate to me that there is little risk to the initial harvest level, and to short-term timber supply, as a result of uncertainty in existing stand yields. The implications of the uncertainty are likely a delayed increase to the higher long-term harvest level for the TSA. I will discuss my considerations of this further under 'Reasons for decision'.

Expected rate of growth

- site productivity estimates

Inventory data includes estimates of site productivity for each forest stand. Site productivity is expressed in terms of a site index, which is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow, which in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the age at which a stand will reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e., less than 31 years old), and older stands (i.e., over 150 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the Old-Growth Site Index (OGSI) 'paired plot' project and the 'veteran' study—as well as results from using the Site Index Biogeoclimatic Ecosystem Classification System (SIBEC) suggest that actual site indices may be higher than those indicated by existing data from old-growth forests. Such studies indicate that site productivity has generally been underestimated by the inventory file data; managed stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

No local site index studies have been conducted in the Mackenzie TSA. Sensitivity analysis was used to assess the impact to timber supply if site productivity is underestimated to the extent suggested by the OGSI studies. For the sensitivity analysis, the site indices of all stands older than 140 years of age were adjusted. For lodgepole pine and interior spruce, adjustments were based on paired plot data; for all other species, adjustments were based on veteran tree study data. In the sensitivity analysis minimum harvestable ages and green-up ages were not adjusted to account for the increased site productivity.

The sensitivity analysis results indicate that beginning in decade eight, mid- and long-term timber supply could be as much as 24 percent greater than the levels in the base case projection.

District staff believe based on their experience that second growth site productivity is indeed underestimated by the site indices attributed to the old growth stands in the Mackenzie TSA. Observations of regenerating stands indicate much better growth than would be suggested by the site indices attributed to the older stands. However, staff are not able to quality the magnitude of the underestimation, and no local studies have yet been conducted to provide better estimates.

While I acknowledge that there is uncertainty related to the ultimate performance of stands relative to their potential, data from the paired-plot study clearly demonstrates that actual stands are growing at a much faster rate than would be expected based on measurements from the standing old growth inventory. Given existing silvicultural requirements, it is reasonable to expect that full stocking will occur in the majority of managed stands in the Mackenzie TSA, and that the stands will be managed to minimize losses to pests and competing vegetation. Therefore, while the exact magnitude of the productivity increase is not certain, I believe it is highly reasonable to expect that most second-growth stands will grow more quickly than productivity estimates based on site index values derived from old-growth stands would suggest. In this determination, I am prepared to take into account the implications of this underestimation for timber supply. I expect that timber supply in the mid- to long-term is greater than projected in the base case, and I will discuss my considerations of this further under 'Reasons for decision'.

I note that local data will provide much needed certainty around the magnitude of site productivity adjustments appropriate for the Mackenzie TSA, and I strongly encourage the collection of data from stands within the TSA over the term of this determination.

- use of select seed

The Forest Practices Code requires the use of the best genetic quality (seed and vegetative material) natural seed available for regeneration. Select seed produced from seed orchards is the product of B.C.'s forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy and vigorous trees.

Select seed from seed orchards produces trees that grow faster than those from natural stand seed. As a result, a stand composed of trees from select seed has a greater volume at the same age than a natural stand with the same species composition. Current expectations are that the volume differences will begin to decrease beyond a certain stand age.

No adjustments were applied to account for the use of select seed in the base case forecast for the Mackenzie TSA. District staff estimated that select spruce seed has been used for approximately 10 percent of regeneration annually over the past few years. Evaluation of genetic worth estimates in combination with this current level of use indicate mid- to

long-term timber supply could be 1 percent greater than assumed in the analysis on this account.

I have considered the information regarding the use of select seed in the Mackenzie TSA and the impact on medium and long-term timber supply. I am satisfied that it is appropriate to account for the timber supply implications of the current level of use, as discussed further under 'Reasons for decision'.

- minimum harvestable ages

A minimum harvestable age is an estimate of the earliest age at which a forest stand has met minimum merchantability criteria. In practice, many forest stands are harvested beyond the minimum harvestable age due to constraints on harvesting which arise from managing for other forest values such as visual quality, wildlife and water quality.

In preparation for the timber supply analysis, district staff reviewed data from current practice and compiled a set of criteria to determine minimum harvestable ages. The criteria used were species, minimum stand volume, minimum stem diameter, and expected harvest system.

The derived ages ranged between 60 and 250 years for natural stands, and between 50 and 180 years for managed stands. District staff confirm that the criteria used to develop minimum harvestable ages are reflective of the criteria guiding current harvesting practices in the TSA.

It is always difficult to precisely estimate minimum harvestable ages, as to some extent it requires an estimation of future preferences and markets. I have considered the information regarding minimum harvestable ages, and I am satisfied that the assumptions applied in the analysis were an appropriate reflection of current practice. However, I encourage ongoing review of the criteria to ensure that they continue to represent operational considerations.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

<u>Expected time for forest to be re-established following harvest</u>

I have reviewed the information regarding regeneration, impediments to prompt regeneration and not-satisfactorily-restocked areas, and I am satisfied that the assumptions in the analysis for these factors were appropriate. As a result, I will not discuss my considerations of these factors in detail in this rationale.

In the base case, a three-year regeneration delay was modelled for all species. Subsequent to the analysis, district staff conducted a silviculture record review and now indicate that current practice is better reflected by assuming an average regeneration delay for coniferous species of one to two years and no regeneration delay for deciduous species.

A shortened regeneration delay would also reduce both ages to green up and minimum harvestable ages. Sensitivity analysis was not conducted to assess the timber supply implications of a reduction in regeneration delay from that assumed in the base case.

I have reviewed the information regarding the differences between current practice and the assumed regeneration delay in the analysis. I estimate that mid- to long-term timber supply could be underestimated in the base case by up to two percent on this account.

As a result, I am satisfied that the mid- long-term timber supply might be slightly underestimated by applying a three-year regeneration delay for all species and I will discuss my considerations of this further under 'Reasons for decision'.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

I have reviewed the information regarding silvicultural systems, commercial thinning, and incremental silviculture, and I am satisfied that the base case assumptions for these factors were appropriate. As a result, I will not discuss my considerations in the rationale.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

I have reviewed the information regarding the utilization standards and the decay, waste and breakage factors assumed in the analysis for the Mackenzie TSA, and I am satisfied that these factors were appropriately modelled in the analysis.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

- cutblock adjacency/green-up

I have reviewed the information regarding the assumption in the analysis for cutblock adjacency and green-up, and I am satisfied that current practices were appropriately reflected in the analysis. As a result, I will not discuss my considerations in detail in the rationale.

- recreation

I have reviewed the information regarding the analysis assumptions to account for the management consideration for recreation, and I am satisfied that these factors were appropriately modelled in the analysis.

- wildlife habitat

The Mackenzie TSA contains an abundance of fish and wildlife. The LRMP was approved by government in November 2000 and details several wildlife species which require future consideration in the TSA, including the following: bull trout, fisher, grizzly bear, mountain goat, and goshawk. The area supports a number of plant and animal species that require special consideration due to their rarity, restricted ranges or special habitat requirements.

Those assumptions applied in the analysis to account for the management of wildlife habitat which I accept based on my review will not be further discussed in this document. These factors include the accounting in the analysis for the management requirements for caribou and moose.

My consideration of the analysis assumptions to account for the management for identified wildlife and grizzly bear habitat are described below.

1) identified wildlife

'Identified wildlife' refers to species at risk (red- and blue-listed) and to regionally significant species which are potentially affected by forest management activities and which may not have been adequately accounted for with existing management strategies, such as those for biodiversity, riparian management, ungulate winter range or through the application of other forest cover constraints. Species at risk as defined under the Forest Practices Code also includes those species that are not considered at risk provincially but which have regional populations that may be threatened. The intent is that by addressing the habitat needs of 'regionally important wildlife' early on, the possibility that they will become listed provincially as threatened or endangered at a later date may be avoided.

Volume I of the IWMS was released in February 1999 and detailed several species which may occur and which require future consideration in the TSA. These species were also identified in the Mackenzie LRMP.

Identified wildlife species will be managed through the establishment of wildlife habitat areas (WHAs) and implementation of general wildlife measures (GWMs). One WHA for an identified wildlife species, covering 30 hectares, has been established thus far in the Mackenzie TSA. This area was not explicitly excluded in timber supply analysis. No other accounting for identified wildlife was made in the timber supply analysis.

Based on data accumulated on the habitat requirements for the identified species, the estimated impact of IWMS was projected at one percent of the short-term harvest level for the province. Government has committed to limiting the impact of management for identified wildlife to this level in the short-term.

I am mindful that only one WHA has been established in the Mackenzie TSA to date, comprising a small area. It is not possible in this determination to specify the exact location or precise amount of additional habitat area that will be required within the timber harvesting land base to implement the IWMS. However, given the Province's commitment both to implement the IWMS, and to limit short-term timber supply impacts to one-percent province wide, as well as the expected occurrence of identified wildlife in this TSA, I find it appropriate to account for a one percent impact on timber supply, and I will discuss this further under 'Reasons for decision.'

I encourage the appropriate staff work to establish WHAs and implement GWMs prior to the next determination for the Mackenzie TSA. The establishment of these areas is a significant protective measure of the Forest Practices Code, and will assist with long-term planning and reduce operational conflicts between wildlife and harvesting.

2) grizzly bear

Grizzly bears reside in the Mackenzie TSA. Grizzly bears are a blue-listed species and are "identified wildlife" under the Forest Practice Code. In the TSA, several habitats have been identified through the LRMP as critical to grizzly bear survival, including avalanche chutes, seepage site, meadows, wetlands and riparian areas.

The management requirements for grizzly bear habitat arising from the LRMP were not finalized at the time of the analysis and therefore were not modelled in the base case. Strategies and mapped habitats are expected to change over time as further information is gathered and provincial or regional research studies are completed. Requirements for grizzly bear habitat include maintaining a mosaic of habitats at the landscape level, maintaining specific stand level attributes such as forage, cover and denning sites, and managing access.

The LRMP recommendations for managing grizzly bear habitat are beginning to guide current practice in the TSA. In particular, district staff indicate that spring habitat requirements now guide operational practice. Under the LRMP recommendations, all harvested stands in areas of spring grizzly bear habitat are to be naturally regenerated with a regeneration delay of five years. A sensitivity analysis was conducted as part of the timber supply analysis which indicated that the full implementation of this strategy will result in a six percent reduction in medium- and long-term timber supply. However, a subsequent review revealed an error in this published sensitivity analysis. The new analysis indicated that the impact is a slightly less than 1 percent reduction in medium and long-term timber supply.

I have reviewed the information regarding the management for grizzly bear habitat. I note that the operational implementation of the LRMP recommendations for grizzly bear is still in its initial stages. It is difficult at this time to assess what timber supply implications might result from the implementation of the other management measures to protect critical grizzly bear habitat.

I am satisfied that it is appropriate to take into account in this determination the timber supply implications resulting from the management considerations for spring habitat, as detailed in the LRMP recommendations. I note that the medium and long-term timber supply may be reduced by slightly less than 1 percent as a result, and I will discuss my considerations of this further under 'Reasons for decision.'

As management objectives for grizzly bear habitat are implemented in the TSA, additional data will become available. Any resulting implications to timber supply can be incorporated in a future determination.

- community watersheds

I have reviewed the information regarding the analysis assumptions to account for management considerations in community watersheds in the Mackenzie TSA, and I am satisfied that the analysis appropriately reflected current practices. As a result, I will not further discuss my considerations in this rationale.

- riparian areas

Riparian areas occur along streams, around lakes and in wetlands. The *Riparian Management Area Guidebook* requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats.

Comprehensive local stream and fish habitat inventories were not available for the Mackenzie TSA. Data from a sample of three mapsheets assessed in 1995 was reviewed by BCFS and MELP staff and determined to represent the best available information at the present time. For the analysis, BCFS regional staff calculated a 7.2 percent land base reduction to account for management in RRZs and RMZs using this data.

A total of 116 372 hectares were excluded from the timber harvesting land base in the analysis to account for management considerations for riparian habitat.

Licensees expressed the opinion that the reduction used in the analysis to account for management in riparian areas was too high. In their opinion, a 5 percent land base reduction would be more reasonable. District staff agreed that the reduction for riparian areas is indeed based on a very small sample size. However, in the absence of localized stream inventory data, district staff believe that the data used to determine the reductions applied for RRZs and RMZs in the analysis is considered to be the best information at present.

I have considered the information regarding the exclusions applied to account for management in riparian reserve and management zones in the analysis, and I accept that the data used is the best available information. I encourage the collection of local data on practices in RRZs and RMZs for the next timber supply review to ensure that the analysis assumptions reflect current management.

- landscape-level biodiversity

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. Managing for biodiversity is based in part on the principle that this—together with other provisions in the Forest Practices Code, such as riparian management, maintenance of wildlife trees, and other forest cover objectives—will provide for the habitat needs of most forest and range organisms. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located

patches of old-growth forests for species dependent on, or strongly associated with, old-growth forests.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. For the Mackenzie TSA, landscape unit boundaries were delineated by the district manager and the designated environmental official in 1998. The landscape unit boundaries are expected to be formally established by 2002.

The *Landscape Unit Planning Guide* outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—which may be employed when establishing biodiversity management objectives for a landscape unit. The guide outlines the proportions of each subregional planning area that should be assigned to each of the three BEOs. The proportions in lower and intermediate biodiversity emphasis can range from 30 to 55 percent, but the average is approximately 45 percent of the area in lower, 45 percent in intermediate, and 10 percent in the higher BEO. The policy generally followed for timber supply analyses when landscape units and BEOs have not been formally established is to model the distribution of BEOs using a weighted average forest cover requirement.

District staff indicate that current practices in the TSA have been guided by the draft landscape unit boundaries and draft BEO assignments. As a result, the draft landscape unit boundaries and BEOs were used in the base case of the analysis in place of the weighted averages. Sensitivity analysis was used to assess the timber supply implications of applying the standard provincial approach, and the results indicated that the application of average BEO requirements did not affect the base case harvest levels.

In addition, the recently approved Mackenzie LRMP provides recommendations for landscape level biodiversity which will guide practices in the TSA. The assignment of BEOs under the LRMP differ slightly from those modelled in the base case. Under the LRMP, high emphasis is assigned to the special resource management zone, intermediate emphasis to the general resource management zone, and low emphasis to the enhanced resource management zone. However, sensitivity analysis to assess the timber supply implications of changing the assumptions to better reflect the LRMP recommendations showed timber supply is not affected. As a result, I am satisfied that there are no implications to timber supply of any small variations between the BEO assignments modelled in the base case and the recommendations of the LRMP.

I have reviewed the assumptions made to account for landscape level biodiversity in the analysis for the Mackenzie TSA, and I am satisfied that the majority of the assumptions appropriately reflect the provincial policy direction for achieving landscape level biodiversity requirements provided in the *Landscape Unit Planning Guide,* as well as provide results that are consistent with the LRMP.

My consideration of the assumptions for which I believe some adjustment is required, or for some other reason feel it appropriate to provide in this document is detailed below.

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1) seral stage requirements

Current management for landscape level biodiversity in the Mackenzie TSA includes provision for the maintenance of young seral, mature seral and old-growth forest in accordance with the *Landscape Unit Planning Guide.*

Requirements for both mature and old forest were modelled in the timber supply analysis in accordance with the Guide (note that the analysis report incorrectly stated that young seral forest requirements were also modelled). The forest cover requirements were applied at the biogeoclimatic variant level within each landscape unit as a minimum percentage of the productive forest land base which must be retained in stands meeting the requirements for mature and old forest. Mature seral requirements were set for landscape units with high and intermediate BEO assignments within Natural Disturbance Type (NDT) 3.

The *Landscape Unit Planning Guide* permits old forest requirements for areas with low BEOs to be met within three rotations. However, operational planning in the Mackenzie TSA has been guided by the full requirement for old seral forest for several years. As a result, in the timber supply analysis for the Mackenzie TSA, the full requirement for old seral forest was required to be met immediately, as was the mature seral requirement for high and intermediate BEO areas in NDT 3. In the Mackenzie TSA, due to the relatively high proportion of older forest, the current AAC can be met throughout the analysis horizon even with the full requirements for old and mature seral forest as modelled in the base case.

Having considered the information regarding the seral stage contributions assumed in the base case, I am satisfied that the analysis assumptions appropriately reflect current practice and are suitable for use in this determination.

2) future ages of non-contributing forests

In the timber supply analysis for the Mackenzie TSA, forests outside the timber harvesting land base were assumed to continue to age over time such that eventually all non-contributing forests were over 250 years of age.

The implications of this assumption are that no allowance is made for the possible influences that natural stand disturbances such as fire, insects or disease may have through time. In terms of landscape level biodiversity, a larger proportion of the old seral requirements are assumed to be met over time by non-contributing forests in the modelling than may be realized operationally. In the Mackenzie TSA, natural disturbance patterns are such that infrequent, but large wildfires affect the age class structure of the forests on the non-contributing land base. District and Timber Supply Branch staff agree that the expected stand dynamics do not include continued ageing of the non-contributing forest. Public input also expressed concerns about the validity of these assumptions.

Sensitivity analysis, in which the stands on the non-contributing land base were assumed to be disturbed during the first decade following the achievement of the old seral age, rather than assumed to continuously age, showed no effect to timber supply.

I have reviewed the information regarding the analysis assumptions about the ageing of the forests on the non-contributing land base. Although I believe it is unrealistic to assume continued ageing of the non-contributing forests, I am satisfied that there are no implications to timber supply for this determination.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Mackenzie Land and Resource Management Plan

Portions of plans arising from strategic land use planning processes such as regional or subregional planning (land and resource management planning) may be declared as higher level plans under the Forest Practices Code. A higher level plan defined under the Forest Practices Code establishes government's social, economic and environmental objectives, thereby setting the resource management context for developing subsequent operational plans.

The Mackenzie Land and Resource Management Plan was approved by government in November 2000 after the timber supply analysis was completed. Many of the recommendations from the LRMP were not incorporated into the base case of the timber supply analysis. The timber supply implications of those recommendations guiding current practice were evaluated through sensitivity analysis.

The protected areas and special management wildland zones designated as part of the LRMP were excluded in the derivation of the timber harvesting land base in the analysis.

Those recommendations arising from the LRMP that were not included in the base case but that guide current practices are those related to the following: grizzly bear habitat, caribou habitat, draft landscape level biodiversity, and scenic areas. My considerations of the implications for timber supply of these recommendations are discussed under each appropriate factor.

I am aware that current practice in the Mackenzie TSA is guided by the recommendations arising from the LRMP. I believe that through the ongoing implementation of the approved LRMP, that increasingly greater clarity around the management of specific resource values will be attained. If, during this period, management considerations for specific values become less or more constraining than those arising from the LRMP which I am taking into account in the determination, this can be factored into a future determination.

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old growth to harvesting second growth is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large volumes of older forests often permits harvesting above long-term levels without jeopardizing future timber supply. In keeping with the objectives of good

forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

Several harvest forecasts would have been possible for the Mackenzie TSA, given the current management regime and assumptions made in the analysis. The assumptions for these options are discussed in detail in the *April 2001 Mackenzie Timber Supply Area Analysis Report.* Under the assumptions, an even flow starting at an initial harvest level higher than the current AAC may be achievable. It was possible to set an initial harvest level that was up to 20 percent higher than that in the base case forecast, without an unacceptable timber supply disruption in the mid-term and long-term. My considerations of the implications of these alternative flows to this AAC determination are discussed under 'Reasons for decision'.

Community implications

I have reviewed the information presented about the implications to communities of fluctuations in the harvest level in the Mackenzie TSA, including the information in the socio-economic analysis completed as part of the timber supply analysis for the TSA. I am aware of the implications to communities of changes in the harvest levels for the TSA.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

District staff indicate that local mills have a processing capacity of about four million cubic metres per year. I note that this mill capacity is approximately one million cubic metres greater than the current AAC. The current harvest is fully utilized by mills in the TSA.

District staff indicate that several licensees have expressed interest in new facilities or expanding existing facilities over the past year, in particular with respect to the processing of deciduous volume.

At this time, given the preliminary nature of the proposals, I note that it is difficult to predict whether any of proposed facilities will indeed materialize. However, the increasing interest in processing facilities for deciduous volume in the TSA provides me with an indication of possible future demand for this volume. I will discuss this further under 'Reason for decision'.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). The letter and memorandum include objectives for forest stewardship, a stable timber supply, and allowance of time for communities to adjust to harvest-level changes in a managed transition from old-growth to second-growth forests, so as to provide for community stability.

The Minister stated in his letter of July 28, 1994, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability." He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

I have considered the contents of the letter and memorandum in my determination of an AAC for the Mackenzie TSA. As discussed earlier under *deciduous stands*, I will set a partition for deciduous-leading stands in this determination. I am satisfied that this determination is consistent with the economical and social objectives as expressed by the minister.

Local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives. Many public responses to the information report and data package, and to the timber supply and socio-economic analyses were received. The summary of public input is reproduced in full as Appendix 5.

The LRMP, the intent of which forms current practice in the Mackenzie TSA and which has been accounted for in this determination, was approved after years of public dialogue and negotiation. I take this as an important statement of local objectives in the Mackenzie TSA.

Local objectives have been an important consideration in my determination of an AAC for the Mackenzie TSA. I have considered all public input received on the timber supply review, and where possible I have attempted to respond briefly to this input in this rationale.

(c) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire and disease that are not recovered through salvage operations. A number of parasites, fungi or plants can kill trees or degrade the quality and value of logs. Estimates for unsalvaged losses account for epidemic (abnormal) infestations on the timber harvesting land base that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect existing stands (endemic losses) are generally accounted for in inventory sampling for existing timber yield estimation or though other methods. Losses associated with second-growth stands are addressed as noted under *operational adjustment factors*.

District staff reviewed existing data on losses resulting from fire, spruce bark beetle, balsam bark beetle and mountain pine beetle to derive an appropriate value for the analysis. A total of 172 800 cubic metres was assumed to be lost annually, and this volume was excluded from the harvest levels for the entire timber supply forecast.

District staff note that no estimates were available for wind loss, and as a result this factor was not included in the volume reduction.

District staff indicate that a forest health strategy is currently being implemented in the district to manage for current and future bark beetle infestations over a long term planning horizon. Under the strategy, activities and treatments are prioritized in each landscape unit according to assessment of risk. I have reviewed the analysis assumptions about unsalvaged losses in the Mackenzie TSA. I note that the volume estimated to be lost is about 6 percent of the total harvest volume, which appears to be high compared to other similar management units.

I am aware that there were no volume reductions applied to account for losses expected from windthrow, which would suggest a slight overestimation in timber supply. However, unsalvaged losses attributed to spruce and balsam bark beetles total about 132 000 cubic metres per year. I expect that as the district continues to implement its forest health strategy, unsalvaged losses attributable to bark beetles in the TSA will be reduced. In consideration of the interaction of these two factors—the losses attributable to wind and the losses attributable to bark beetles—I believe that I do not need to make any further adjustments at this time.

I accept that the assumptions in the analysis to account for unsalvaged losses represent the best available information for this determination.

Reasons for Decision

In reaching my AAC determination for the Mackenzie TSA, I have considered all of the factors presented to me. My reasoning is discussed below.

The timber supply analysis illustrated that an initial harvest level of 2 997 363 cubic metres per year could be maintained for two decades, before increasing by ten percent to a long-term harvest level of 3 305 000 cubic metres per year in decade three.

Section 8 of the *Forest Act* requires me to consider a number of factors in the determination of an AAC for a timber supply area. In determining an AAC, my considerations identify factors which, when considered separately, indicate that the timber supply may actually be greater or less than that projected in the base case. Some factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by introducing an element of risk or uncertainty to the decision, but cannot be reliably quantified at the time of the determination.

I am satisfied that the assumptions applied in the base case of the analysis for the majority of the factors applicable to the Mackenzie TSA were appropriate. Following is my consideration of those factors for which I consider it necessary in this determination to take into account implications to the timber supply projected in the base case.

Factors that indicate that the timber supply projected in the base case may be underestimated, to a degree that can be quantified with some certainty, are as follows:

1) *deciduous-leading stands* – I accept that the volume contribution to timber supply of deciduous-leading stands in the timber harvesting land base has been underestimated, and that an additional 50 000 cubic metres per year could be attained from the stands;
2) *regeneration delay* – As a result of a slight overestimation in the time to regenerate stands, I accept that mid- to long-term timber supply may be up to two percent greater than was projected in the base case;
3) *use of select seed* – I consider that the current operational use of select seed, which was not accounted for in the base case analysis, indicates that timber supply may be one percent greater in the mid- to long-term than was assumed in the base case;

In addition to those factors listed above, there is also one factor that indicates that the base case projection may underestimate timber supply, but to a degree that cannot be quantified, as follows:

1) *site productivity estimates* – Based on results from the provincial OGSI studies and sensitivity analyses, I conclude that long-term timber supply may be underestimated by up to 24 percent compared to the base case projection;

In addition to those factors that indicate that timber supply may be underestimated in the base case, I have also identified a number of factors that indicate that the base case harvest projection likely overestimates timber supply. Some of these factors can be quantified, as follows:

1) *woodlots* – I will take into account in the determination 3770 hectares, and 11 000 cubic metres of area and volume issued to woodlots since the previous AAC determination, that was not accounted for in the timber supply analysis.

2) *grizzly bear habitat areas* – I am satisfied that it is appropriate to account for the requirements for spring grizzly bear habitat arising from the LRMP. Timber supply in the mid to long term has been overestimated by up to one percent on this account.

Factors that indicate that timber supply projected in the base case may overestimate actual timber supply, but to a degree that cannot be quantified, are as follows:

1) *balsam-leading stands* – I accept that the merchantability of those balsam-leading stands assumed to contribute to timber supply in the base case is uncertain. Mid-term to long-term timber supply could be as much as 13.7 percent less than that projected in the base case, if all of these stands prove to be unmerchantable;

2) *operability in the far zone* – I accept that the economic operability of those stands farthest from processing facilities is also subject to uncertainty, and mid-term to long-term timber supply could be affected by as much as 4 percent if none of these stands are economically operable;

3) *existing stand volumes* – I accept that there is a risk that existing stand volumes are overestimated by the inventory data for the TSA, although the exact magnitude of this overestimation is uncertain. This uncertainty affects mid-term timber supply;

4) *identified wildlife management strategy* – I accept that the implementation of the IWMS, including identification of wildlife habitat areas and application of general wildlife measures, may result in reduction in timber supply of up to 1 percent in the mid- to long-term;

I have considered the factors listed above and have evaluated them on the basis of which portion of the forecast period they affect (the short, mid, or long term).

In consideration of the factors listed above influencing mid-to long-term timber supply in a small way—the reduced regeneration delay and the use of select seed acting to increase timber supply, and the exclusion of areas to account for the implementation of the IWMS as well as the accounting for the management of spring grizzly bear habitat acting to decrease timber supply—I am satisfied that these factors essentially offset one another. As a result, I will make no specific adjustments for these factors in this determination.

In accordance with the *Forest Act*, the volume and area associated with woodlot licences issued since the previous AAC determination do not contribute to the timber supply supporting this decision. In AAC determinations, it is necessary to take into account the exclusion of volume and area in issued woodlots since a previous AAC determination, in order to reflect the separate administration of woodlot licence areas from the TSA. Generally, this results in an adjustment to the AAC for the remainder of the TSA. However, in the case of the Mackenzie TSA, I am satisfied that short term timber supply is sufficiently stable that, while I accept the removal of the area and volume associated with woodlots, it is also my conclusion that I do not need to reduce the TSA AAC on account of

this volume at this time. In reaching this conclusion, I am mindful of the alternative harvest flow which illustrated to me that the harvest level could have been set as high as 20 percent greater than the current AAC for the TSA without unacceptable disruptions in mid- to long-term timber supply. Additional sensitivity analysis indicated that the initial harvest level in the base case could be maintained even with a 10 percent reduction in the size of the timber harvesting land base. In consideration of these results, for this determination, I am satisfied that it is not necessary to explicitly exclude the volume from the initial harvest level shown in the base case.

With the exception of the volume contribution from the deciduous-leading stands, which I will discuss later, the remainder of the factors summarized above have the potential to significantly impact mid to long-term timber supply. However, the magnitude of the timber supply impacts for all of the remaining factors is uncertain.

If existing stand volumes are overestimated to the extent suggested by the inventory audit, mid-term timber supply could be 11 percent lower than shown in the base case, although short and long-term timber supply are unaffected. However, due to the uncertain applicability of the audit to the newer inventory for the TSA, it is not known whether volumes are overestimated to this extent, if at all. In any event, the sensitivity analysis results indicate that the base case initial harvest level can be maintained for nine decades even if the volumes are overestimated by this amount.

With respect to the operability of both balsam-leading stands as well as all stands located in the far zone, I am aware that mid to long-term timber supply could be cumulatively affected by as much as 18 percent on these accounts. However, it is unlikely that all such stands will prove to be inoperable, and further quantification of the uncertainty is not possible at this time.

If one were to assume a purely cumulative effect of the three factors associated with operability and existing stand yields, the impact to mid-term timber supply could be as much as 29 percent, which would reduce the mid term level to a level below that of the current AAC.

I am aware that there is one factor summarized above which has the potential to mitigate the potential for mid-term reductions, if these factors acting to reduce mid-term timber supply were proven to be more certain. With respect to site productivity, I note that a substantial body of provincial research indicates that site productivity has most likely been underestimated. However, the magnitude of the underestimation is not possible to quantify for the Mackenzie TSA at this time, due to the lack of data from localized studies. The sensitivity analysis results indicate that if the site productivity is underestimated to the extent shown by the OGSI studies, then mid- to long-term timber supply could be as much as 24 percent greater. The collection of data specific to the stands in the Mackenzie TSA would help to remove uncertainty and allow for a more precise estimate of site productivity for future determinations.

In consideration of the interactions of these factors, it is difficult to project their cumulative implications for mid-term timber supply. I am aware that an alternative harvest flow projection of timber supply for the Mackenzie TSA indicates that the harvest level could be

increased by as much as 20 percent immediately and still meet the management objectives, constraints, and assumptions on the land base for the TSA. However, if I were to increase the harvest level at this time by the magnitude shown in the alternative forecast, I believe there is still significant uncertainty as to whether it would be necessary to reduce the harvest level again in the mid to long term. In circumstances such as these, I must factor in all parameters and take a balanced approach in considering any potential increase in short-term harvest levels by making allowances for risks that might arise because of identified uncertainties. In this determination for the Mackenzie TSA, I am satisfied that it would be inappropriate to increase the coniferous harvest level beyond that assumed in the base case because of the risk of the various uncertainties influencing mid-term timber supply. Until the issues affecting the mid term supply are more clear, it is difficult to assess what, if any, potential exists to increase the AAC, without disrupting future supplies. However, while it remains unproven, I will add my observation that it is possible that once these issues are addressed, that an increase in AAC may indeed be possible at some future date. I make this statement in order to emphasize the importance and possible value of addressing the noted uncertainties affecting mid-term timber supply.

However, I am mindful that there is one additional factor related to deciduous stands. The volume contribution of deciduous-leading stands was underestimated in the timber supply analysis, and the stands could contribute an additional 50 000 cubic metres of volume annually to the harvest level. There have been many expressions of interest in the processing of deciduous volume in and adjacent to the TSA, and I take these expressions of interest as an indication that there is a demand for an increased deciduous harvest in the TSA. In consideration of the information, I am satisfied that it is appropriate to assume a volume contribution of 100 000 cubic metres per year from deciduous-leading stands.

In summary, I am satisfied that an appropriate harvest level for the Mackenzie TSA at this time is 3 050 000 cubic metres. This harvest level includes a partition of 100 000 cubic metres per year to deciduous-leading stands.

Determination

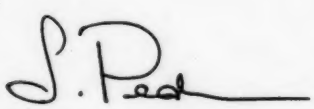
I have considered and reviewed all the factors as documented above, including the risks and uncertainties associated with the information provided. It is my determination that a harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved in the Mackenzie TSA by establishing an AAC of 3 050 000 cubic metres. This AAC includes a partition of 100 000 cubic metres for deciduous-leading stands.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this decision and leading to the subsequent determination, I encourage BCFS staff to undertake the tasks and studies noted below that I have also mentioned in the appropriate sections of this rationale document. I recognize that the ability of staff to undertake these projects depends on available staff resource time and funding. These projects are, however, important to help reduce the risk and uncertainty associated with key factors that affect the timber supply in the Mackenzie TSA. I recommend that BCFS staff do the following:

- Review and redefine the economic operability data, in particular in balsam-leading stands and in the stands in the far zone;
- Attempt to quantify the extent of isolated areas in the special planning cells, and any impacts to timber supply;
- Monitor harvest activities in the far zone;
- Monitor the performance in deciduous-leading stands;
- Monitor the performance in balsam-leading stands;
- Conduct a study on site productivity specific to the TSA;
- Complete the vegetation resource inventory for the TSA, in order to provide data which will help to evaluate existing stand volumes; and
- Redefine the inventory information on riparian areas and clarify the applicable management regimes.



Larry Pedersen
Chief Forester
October 11, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silvicultural treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

   (a) encourage maximum productivity of the forest and range resources in British Columbia;

   (b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

   (c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the government and with the private sector;

   (d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

   (e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

Appendix 5: Summary of Public Input

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of
British Columbia

Minister of
Forests

Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
Ministry of Forests
OFFICE OF THE MINISTER

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: **The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests

Mackenzie Timber Supply Area
Timber Supply Review

Summary of Public Input

BC Ministry of Forests
Mackenzie Forest District
Bag 5000
1 Cicada Rd.
Mackenzie, BC
V0J 2C0

October 11, 2001

This is a summary of the public input received on the Timber Supply Review in the Mackenzie Timber Supply Area. This summary does not assess the feasibility or validity of the input or whether it relates to the clearly defined mandate of the chief forester in the allowable annual cut determination.

Mackenzie Timber Supply Area

Background

As part of the review of timber supply in the Mackenzie Timber Supply Area (TSA), two opportunities were provided for public input. The first followed release of the Mackenzie TSA *Data Package* and *Information Report* in April 2000. The *Information Report* was a non-technical summary of the draft data and management assumptions that were to be applied in reviewing the timber supply for the Mackenzie TSA. A 30-day review period, ending May 15, 2000, was provided for the public to comment on these documents.

On April 11, 2001, the British Columbia Forest Service released the *2001 Mackenzie Timber Supply Area Analysis Report* and *Public Discussion Paper*. The public was encouraged to review and comment on the accuracy of the information in these documents and to provide additional information during the 45-day review period that ended May 28, 2001.

This report summarizes the input received during both public review periods. This information was provided to the chief forester for his consideration when he reviewed the allowable annual cut (AAC) for the Mackenzie TSA. The first section of this summary outlines the public review process implemented by the Forest Service, and describes the types of public input received. The second section summarizes the public input in sufficient detail to indicate the range of input received. The original submissions (with personal identifiers removed in accordance with the *Freedom of Information and Protection of Privacy Act*) can be reviewed at the Mackenzie Forest District office.

Public Review Process and Response

Mackenzie District staff actively solicited public input on the Timber Supply Review in the Mackenzie TSA through the following actions:

- the *Information Report*, *Data Package*, *Public Discussion Paper* and *Analysis Report* were available at the district office in Mackenzie and the regional office in Prince George.
- copies of the documents were mailed on request.
- newspaper and radio advertisements were placed, advising of the availability of all documents for review by the public and offering presentations on request.
- a presentation on the *Analysis Report* was made to the Mackenzie District Council.

The Mackenzie Forest District received four written submissions on the *Data Package* and five submissions on the *Analysis Report* (see Appendix 1).

Public Input

In this section, public input on the information presented in the Timber Supply Review documents for the Mackenzie TSA is summarized under the following headings:

- Data Package (and Information Report)
- Timber Supply Area Analysis Report (and Public Discussion Paper)
- Other comments

Mackenzie Timber Supply Area

Data Package

Land Base Factors

Two forest industry submissions comment on the statement in the *Data Package* (section 5.1) that no opportunities exist to increase the size of the timber harvesting land base (THLB). They say this statement is misleading at best and suggests a conclusion has already been reached before sensitivity analyses on factors affecting the THLB are completed.

Slocan Forest Products (Slocan) says with the current appraisal system and continuing road development, the separation of the TSA into near and far zones seems redundant. The company says all stands that meet minimum volume requirements should be included in the THLB, and recommends including all or a portion of the excluded conventional harvest stands in the far zone.

With regard to deductions from the land base for Environmentally Sensitive Areas (ESAs), two industry submissions say the percentage reductions seem arbitrary and excessive. They suggest these reductions need to be reviewed based on harvesting history. Slocan expresses concern about duplication and double-counting and asks for the protocol used to ensure this doesn't occur. Slocan also suggests the use of recent terrain stability mapping to update sensitive soil ESAs.

Donohue Forest Products (Donohue) says the factors used to exclude certain types of forests from the THLB do not reflect significant changes in planning since the last Timber Supply Review. The company says with the concentration on seral stage and patch size distribution for regulating harvest flow, older stands are now included. Donohue provides detail on their harvesting performance in excluded stands and recommends that age class 5 and 6 balsam-spruce stands and certain marginal types be included in the timber supply analysis.

Two forest industry submissions say the assumptions of road widths removed from the THLB are excessive, and recommend a 12-metre width for non-status roads and 10-metre width for operational roads. Slocan also suggests a 16-metre width for mainline roads.

An individual submission says parks and Special Management Zones resulting from the Mackenzie Land and Resource Management Plan (LRMP) must be considered in estimating the size of the land base.

Forest Inventory

Three submissions comment on in the lack of complete inventory information for this TSA.

An individual says if the Forest Service is not going to inventory the northern part of the TSA, then it should either be removed or a sensitivity analysis should examine the impact of harvesting for 25 years at a rate based on an inventory that's never been determined.

Two forest industry submissions say it's misleading to show the forest cover inventory vintage as 1999, when it is merely a computer-modeled update of information collected in 1973. They also question whether updated information on biogeoclimatic classifications in the TSA will be used.

Expected Productivity

An individual submission says the model used to predict volumes for existing stands is based on data from all over the province and a recent audit showed that actual volumes are about 90 per cent of predicted volumes. Similarly, the model for regenerated stands is not based on local information and productivity estimates are likely high due to the northern location of this TSA.

Mackenzie Timber Supply Area

Not Satisfactorily Restocked Areas

Donohue says the area estimated to be Not Satisfactorily Restocked under the Small Business Program seems excessively high and asks for verification of this number.

Silviculture Systems

Two forest industry submissions say the ratio of managed to unmanaged stands aged 13 to 20 years should be 80-90 per cent managed and 10-20 per cent unmanaged, since significant planting began in the early 1980s. Slocan maintains that all harvested areas are managed so use of the term unmanaged may not be appropriate.

Unsalvaged Losses

Two forest industry submissions question the estimates of unsalvaged losses and ask to see the information used so proper review comments can be provided. Slocan wants to ensure the time frame used is representative of average conditions and the volume losses represent only losses within the THLB. Slocan also recommends modeling a reduction in unsalvaged losses as older stands are harvested.

An individual submission notes the estimate of losses represents about six per cent of the current AAC. While this does not cause significant planning constraints now, if second pass impacts are severe the overall impact should be considered now.

Forest Cover

The submission from the Ministry of Environment, Lands and Parks (MELP) says the green-up height used in the Integrated Resource Management zone should be three metres, not two. MELP says reducing the height requires approval by the designated environmental official and this has not occurred. MELP notes that when the current definition is applied to a plantation, the effective green-up height is around 2.4 metres, demonstrating the difference between the legal definition and how it's implemented on the ground.

Two forest industry submissions ask for clarification as to what specific forest cover objectives will be met by forests that do not contribute to timber supply. Slocan says forested areas outside the THLB should be the first areas used to meet forest cover objectives, and this should be a firm commitment in the base case analysis.

Visually Sensitive Areas

Donohue says the reference to the eight known scenic areas should be clarified to ensure the public understands they are recommended but not established under the Forest Practices Code.

Biodiversity and Riparian Management

Three submissions question the use of three map sheets as the basis for estimating the riparian netdowns. Donohue says a minimum sample of five per cent of map sheets should be assessed to determine an appropriate netdown. Slocan says until more reliable information is available, the 2.1 per cent estimate for short-term Code-related riparian impacts should be used in the base case. Slocan also recommends that any reductions to timber supply from riparian reserves be used to meet wildlife tree patch objectives where possible.

Donohue notes that the reductions for biodiversity and riparian management exceed the 4.1 per cent target set by the chief forester for Code impacts. An individual submission says the reductions are likely realistic and should not be considered conservative.

Mackenzie Timber Supply Area

Wildlife Management

MELP says that because the LRMP has not been approved, all the deferred wildlife habitat areas identified in the previous Timber Supply Review should remain as deferred.

Two forest industry submissions question the approach for estimating the netdown for wildlife tree patches (WTPs). Donohue says if the sample of silviculture prescriptions identified an average WTP retention of 3.7 per cent, then the residual level should be no higher than 1.85 per cent. Slocan recommends using a maximum of a two per cent netdown, noting that numbers from silviculture prescriptions do not reflect the new policy that a maximum of 50 per cent of WTPs should be located in the THLB. Both companies express the opinion that WTP requirements could be achieved outside the THLB, requiring no netdown.

First Nations

An individual submission says the McLeod Lake Treaty 8 Settlement should be incorporated in the analysis as it has been ratified. As well, this individual suggests that an analysis of timber in the northern third of the TSA must consider First Nations issues in the Ingenika River and Fort Ware areas, and an area reduction should be considered.

Timber Supply Area Analysis Report

Land Base Factors

An individual submission expresses concern about the 25 per cent increase in the size of the THLB from the *Data Package* to the *Analysis Report*, especially since no additional field data was collected and this is a net increase after the removal of 1.78 million hectares of protected area. Accomplishing this increase by reducing the inoperable area to 0.3 per cent of the forested land base is not realistic, according to this submission. Based on experience in the TSA, this individual says the inoperable (not including high elevation stands and riparian areas) would be closer to five per cent.

The individual submission says a significant number of areas in the THLB are high elevation balsam stands, much of them in areas previously considered uneconomical. Without actual field and economic analysis, designation of these stands as more than 75 per cent operable may be premature, this individual says, noting that inventory labels may be inaccurate and these stands are typically snowbound for at least seven months of the year.

Forest Inventory

Slocan expresses agreement with the statement in the *Analysis Report* that the "existing inventory may overestimate volumes by more than 10%; however, more detailed assessment is needed to verify the results." Donohue says the vintage of the inventory is an ongoing concern that needs to be addressed.

Productivity Estimates

Slocan says the base case forecast implies an annual growth rate of 2.39 cubic metres per hectare per year which they say seems conservative and should be field-verified.

Donohue says the sensitivity of timber volume estimates for both managed and unmanaged stands requires field validation, and expresses concern that very little data is used in the preparation of volume estimates.

An individual submission expresses concern that growth-and-yield models overestimate volumes, since the Mackenzie TSA is at the northern end of the data set. This individual notes that an audit of unmanaged forest volumes showed the model's predictions were 10 per cent higher than actual volumes, and that no similar audit was done for managed stands.

Riparian Management

Donohue says the sample size and methods used to calculate the netdown for riparian management need further work before the next Timber Supply Review.

Unsalvaged Losses

Slocan says losses to fire and pests seem low given recent attacks by the balsam bark beetle and the spruce budworm, especially in the east-central portion of the TSA.

Donohue says estimating unsalvaged losses due to fire is relatively simple, but other losses are more difficult to quantify. The company says the statement in the *Analysis Report* that the effects of budworm damage were factored into the yield curves for unmanaged stands is difficult to accept since there are very few data sources available to validate any changes.

Harvest Schedule

Donohue says in future timber supply analyses, the 'oldest first' rule must be re-examined to ensure it applies following implementation of biodiversity guidelines.

Mill Requirements

Timberline Consultants, writing on behalf of Ainsworth Lumber Co., notes the company's intent to pursue licences to harvest deciduous volume within the Mackenzie TSA. The consultants carried out a deciduous resource study and the results demonstrate that significantly more area is suitable for deciduous management than currently identified in the timber supply analysis, including five units that are candidates for an area-based tenure in the southern third of the TSA.

Ainsworth Lumber Co. says they are working to develop partnerships with local hardwood users that would ensure they have a secure supply of sawlogs and that the residual pulp-grade fibre would be available for Ainsworth's OSB facility in 100 Mile House. The company asks that their intentions be considered to ensure the full supply of the hardwood resource is recognized.

Other Comments

Most submissions comment on factors or issues other than those specifically covered by Timber Supply Review documents. These comments are summarized in this section.

Timber Supply Review Process

The primary area of concern regarding the process is the lack of reliable inventory data. Slocan says the inventories require an extensive update to create a greater level of confidence in the base case and enable an accurate assessment of timber supply and risk factors. Both forest industry submissions say government must ensure a vegetation resources inventory is completed and validated in time for the next Timber Supply Review. As well Donohue says a field evaluation of yield estimates and a review of unsalvaged losses are needed.

Donohue asks the status of the three tasks identified in the last Timber Supply Review that were to be completed by this one. The company also says the *Data Package* does not provide sufficient information to allow a reasonable assessment of the data and assumptions, and 30 days is not an adequate time period.

Harvest Levels

Three submissions comment on the harvest level for the Mackenzie TSA. Slocan suggests that, given little change in the data from the last Timber Supply Review, the current AAC be maintained. Timberline urges the Ministry of Forests to consider Ainsworth's interest and increase the deciduous partition, based on revised merchantability cutoffs, increased demands on other deciduous supplies, and

sustainable management of the resource.

An individual submission identifies a number of downward pressures on timber supply, including the estimate of inoperable ground, uncertainty about high elevation inventory labels, and overestimates of stand volumes and yields. This submission says to continue harvesting at the current rate, given these uncertainties, has the potential to create a large timber shortfall in the coming decades.

Appendix 1

Submissions received by the Mackenzie Forest District

Submissions received on the Data Package

Forest industry

Slocan Forest Products Ltd.
Donohue Forest Products Inc.

Consultants

One submission

Government agencies

Ministry of Environment, Lands and Parks

Submissions received on the Timber Supply Analysis Report

Forest industry

Donohue Forest Products Inc.
Slocan Forest Products Ltd.
Ainsworth Lumber Co. Ltd.
Timberline Forest Inventory Consultants Ltd.

Consultants

One submission